1:Stanford U. S-4, 5 1956 AF16 SW China AF16

II. SOIL AND VEGETATION

134 The soil in the Szechwan plain is mainly a combination of eroded dark red sandstone, yellow shale, and limestone. Underneath is a layer of clay. High fertility of this type of soil is attributed to its rich mineral contents that are easily absorbable for plants and not easily washed away by erosion. Red soil of various ages cover most of the land in Yunnan Province. This type of soil shares a number of properties with common clay. In western Szechwan and western Yunnan, where the mountains are, one can find thick layers of dark grey soil, the comparatively high acidity of which is a result of abundant coniferous woods. In the former province of Sikang, the top soil is thin, often deep dark brown or black in color, and of the plateau-grassland type.

137 Vegetation in this region can generally be divided into categories according to the altitude of the land. Along the Yangtze River in Szechwan Province, fruits like the orange and the peach, and trees like the bamboo and the palm, grow easily. On the hills up to 5,000 feet in elevation around the Szechwan plain are found oaks, evergreens, and ferns; sweet potato and maize are also planted. On higher mountains in western Szechwan and some parts of Yunnan, coniferous forests thrive magnificently, with shrubs of the rhododendron family carpeting the foothills. Dwarf juniper and flowering herbs cover the meadows at 11,550 to 15,500 feet. At still higher

2: Rock K-5 (1934-) 1947 AF16 Southwest China AF16

flows along its eastern margin — *k'a* being a ravine. The Chinese name of the hamlet is Wen-hua-ts'un 文華村. Formerly it was known as San-chia-ts'un 三家村, as originally only three families lived there. To-day there are eighteen.

The most northerly village on this part of the plain, situated at the actual foot of the snow range at an elevation of 9,400 feet, is Nv-lv-k'ö, consisting of about 100 families (PLATES 74, 75, 76).

South of Wûa-dtv k'o-dü, on the main road to Li-chiang and east of Pai-sha, is the hamlet T'a-bbu-d'a, called in Chinese T'ai-p'ing-ts'un 太平村. T'a-bbu-d'a was originally one of the 12 *d'a* (residences) owned by the Mu family. It was the place where they worshipped their ancestors; when performed in the sixth moon, the service was known as *T'a-bpö*. To the east of T'a-bbu-d'a is a small hamlet of seven or eight families called Nda-la-k'o-dyü, also belonging to Mu-tu-ts'un.

Another larger village consisting of over 100 families, called Nyi-mä-t'u-ts'an in Na-khi, and in Chinese, Hsiang-yang-ts'un 向陽村 (Facing the sun village), is north-east of Pai-sha.

Rice cannot be cultivated on this northern part of the Li-chiang plain, as the soil is too stony and there is not enough water to irrigate the fields, furthermore the altitude is too great. The Na-khi plant wheat, maize, potatoes, barley, oats, beans and peas also the rape-turnip *Brassica rapa depressa* which they call *ngyu* (the *man-ching* 蔓菁 of the Chinese). The tuber itself is called *'a-k'ö*. Opium was also grown for Chinese consumption. South of and in the actual neighborhood of Li-chiang, opium was grown in the spring, and rice during the rainy season.

Gv-bö, in Chinese, Chiu-tzu-hai 九子海 (Nine lakes) is a district lying east of the long limestone spur which hems in this part of the plain. It has been settled only recently. Peasants from the village of Pai-sha-kai have started homesteads and planted fields. Previous to the settling of the Na-khi, a few Li-su and Lo-lo had built their poor huts there and carried on cultivation. The Chinese name is derived from the several circular basins which are filled with water all the year round.

The range in which is situated Gv-bö, better known as Gv-bö la-zhěr gko [the name appears also in Na-khi literature, and has reference to the tigers which once roamed in its forests and meadows: *la* = tiger, *zhěr* = sound, noise, *gko* = alpine meadow], is composed of old limestone. The sharp rocks projecting through the mass of scrub oak (*Quercus semicarpifolia*), give it a peculiar aspect. The highest point of this range is the triangular peak Lv-zhěr-dsu (H-M., Lajatso), approximately 12,000 feet in height. The best approach is from the village of Nv-lv-k'ö or Ssaw-ssu-k'a, whence the ascent can be accomplished in about three hours. From its summit one obtains a glorious view of the entire Yü-lung Shan, that is, the part south of the Yangtze gorge. The northern end of the Li-chiang plain is covered with low pines and oaks (PLATES 77, 78), especially scrub oak; many herbaceous plants with beautiful flowers form lovely carpets in the summer months, and enliven the otherwise grey, stony waste.

Immediately east of the village of Nv-lv-k'ö is a low, circular mound, looking for all the world like an extinct volcanic cone. It is known to the Na-khi as La-lo-dtò-gkv, including a small ravine to the north of it. On the top of this

2: Rock K-5 (1934-) 1947 AF16 Southwest China AF16

7.45 A.M. Yün-nan time, sailing first over the ancient city of K'un-ming, after which it gradually rose to 9,000 feet elevation and during the next half hour climbed to 13,000 feet. 133*

Beneath us were hills, mostly bare, though here and there covered with pine trees. The country below was like a sea disturbed by a terrific gale, resembling huge waves. At 8.10 A.M. we passed the town of Lo-tz'u hsien 羅次縣, flying over it at 12,000 feet elevation. Twenty minutes afterwards we flew over Yüan-mou 元謀 and Ma-kai 馬街 (Horse market), at an elevation of 13,000 feet. To our right we saw mountains north and north-east of Wu-ting 武定, populated by Miaos. Far away to the north was the Ta-liang Shan 大涼山, land of the independent Lo-lo. Deep erosion met the eye everywhere, red soil, bare hills and small plains. From this region, we first sighted the snow range 150 miles away as the crow flies. The atmosphere was clear and the peaks stood out sharply. At 9 A.M. we were flying at 14,000 feet above sea-level. [134] ●

From here, looking north-north-west, we could see 170 miles away the Gangkar-ling peaks, over 20,000 feet in height, and first explored by me in the spring and summer of 1928 (PLATES 55 to 59). To the south and somewhat to the west of us was the 14,000 feet Ts'ang-shan Range, which flanks the Ta-li Lake (Erh Hai).

At 9.10 A.M. we crossed over the Yangtze at an elevation of 15,000 feet, the river a mere ribbon, a streak of brilliant green hurrying across the Yün-nan plateau in its arid bright red gorge. Directly to the west and south of the snow range, and extending from north to south, distant 160 miles, we saw the Mekong — Salween and Salween — Irrawadi divides the latter further south forms the Yün-nan — Burma border, and the former further north the Yün-nan — Tibet border, with Lhasa four flying hours, or 600 miles, distant. To the north-west of the Li-chiang Range the snow mountains which encircle the Chung-tien plateau stood out clearly in the crystal atmosphere.

By 9.30 A.M. we were again nearing the Yangtze further west and crossed one of its many bends and turns. To the south lay the town of Yung-pei, now called Yung-sheng (Eternal victory), on a long plain, and 15 miles to the south of it the lake of Ch'eng Hai 澄海, a sheet of blue water about 26 miles in circumference. From here we flew straight north, but east of the district of Tung-shan (Tung-shan li 東山里) and parallel to the snow range, which stood out in all its glory, covered deeply with a mantle of white. Truly it seemed to float in the atmosphere like a sleeping dragon, enshrouded in purest snow, its sharp peaks and crags piercing the deep blue sky. An aura of majesty encompassed it; overawing all; its neighboring hills lay crowded about as loving children gather around their mother.

Nearly 20,000 feet its peaks tower into the heavens and yet the ever-hastening waters of the Yangtze and time have conquered it.

We continued our flight in a northerly direction till we came abreast the exit of the 'A-ts'an-gko gorge, flanked by the peaks and crags of the snow range. Up to here flying was more or less smooth, only now and then, while passing over the deep Yangtze valley, were we somewhat tossed about.

We flew to the north of Mba-yi-wùa (Ming-yin-wu 鳴音吾), and nearing T'o-k'ö-shĕr (Ch'ang-sung-p'ing 長松坪), we turned west over the alluvial

2: Rock K-5 (1934-) 1947 AF16 Southwest China AF16

*487 *733 *137 military map gives Ch'iao-t'ou 橋頭 below San-kai-tzu (Shang-ko-tzu) and opposite Lä-ndo (Leng-tu), while in reality it is beyond Dsi-gku, which itself is some distance north of San-kai-tzu.

Between Ssaw-ssaw-gku and Dsi-gku, or Dsi-gkv as the Li-chiang Na-khi pronounce it, are several villages, as Muan-ssu-dzhu (H-M., Musödso), or Mu-ssu-ch'ang 木思場 in Chinese, on the Li-chiang side of the river; and on the east bank, or Chung-tien side, the hamlets of Nda-lä (Ta-lieh 打烈; H-M., Ta-lä), and north of it the village of Ss or Ss(ĕr)-lä (H-M., Sa-lä), and north of this, also on the Chung-tien side of the river, the village of Ch'ou-dzhu (H-M., Tschodjio).

[134] [241] Near Dsi-gku the soil is red, and sandstone and mica abound. Opposite the large village of Ta-t'ang 大塘 on the Chung-tien side, the mountain-sides slope gently toward the Yangtze. Here along the river cultivation is carried on, while above the fields are dense pine forests, extending into a valley and up the steep mountain slopes on the Li-chiang side. The fields bear crops of millet and maize and, on the slopes above, rice. A large grove of lovely old oaks, through which the trail leads, relieves the monotony of the sandy fields. Here, near the village of Vu-dzhu (H-M., Mudschuo; the Chinese Wu-chu 梧竹), situated on the Chung-tien side, is a long island.

The scenery is weird and lonely, especially where the trail enters groves of Castanopsis, quercus (oaks) and pines; the mountain slopes are steep and huge boulders lie about everywhere. On the opposite side a narrow, dark valley debouches into the Yangtze at the hamlet of Nda-gka-dü. Five li beyond bring us to the village of Ba-lo (Chinese Pa-lo 巴羅) at the mouth of a long, broad valley, almost as broad as that of the Yangtze itself. An iron chain-bridge spans the Ba-lo gyi which issues from the broad valley. It has two branches, the northern one carrying the larger stream; in the southern branch, called Yi-gv lo, are situated about ten villages.

Ba-lo itself is called Ch'iao-t'ou 橋頭 in Chinese (Bridge-head) on account of the iron chain-bridge which spans the Ba-lo gyi. This is, however, not the iron chain-bridge (T'ieh-ch'iao 鉄橋) which figures so largely in all the battles fought between the Na-khi and Tibetans, nor where the Mongols and the Ming soldiers fought when conquering the territory for China. Ba-lo itself is one of the dreariest spots imaginable and compares unfavorably even with villages situated in the lonely Pa-pien Ho 把邊河 valley in the south of Yün-nan. Altogether three ferries ply across the Yangtze between Shih-ku and Ch'iao-t'ou: one at Shih-ku, where, since my last visit, a crude row-boat, such as is commonly used in this primitive part of the world, has taken the place of the raft; one at Muen-tsü-dtu; and one at Dsi-gkv.

[505] The trail leads over the iron chain-bridge across the Ba-lo gyi,[24] and climbs the slippery rocks on the other side, leading along the steep, rocky bank down to the plain and the village of Muan-fu-k'o (Chu-ko-ling 諸葛嶺).

[24] Ch'iao-t'ou Ho 橋頭河. Its source is over 200 li north-west of Li-chiang, on the south-eastern slopes of the Han-sou Shan. It flows by the guard-station of Ch'iao-t'ou into the Yangtze. The bridge which spans it is called the P'ing-cheng ch'iao 平政橋; it was first built in the second year of Ch'ien-lung (1737) by magistrate Chiang Ch'iao-sun 蔣喬蓀. It was destroyed by fire in the first moon of the fifth year (1740) and rebuilt by magistrate Kuan Hsüeh-hsüan 管學宣 in the seventh year (1742).

5: Davies G-5 (1894-1900) 1909 AF16 Southwest China AF16
Pai-1 AE7

S P 622 the strength of his claiming to possess supernatural powers found no difficulty in raising a following of 150 men. With these he made a strong stockade on top of a hill, and for a long time defied the efforts of the sawbwa to turn him out. Chinese troops had to be sent for, and, under the direction of Colonel Liu, a successful attack was made, and the priest and most of his followers put to death on the spot.

The Möng Na sawbwa, who was present on the occasion, received the military decoration of the Peacock's Feather for his services. But the La-hsa chief got into serious trouble for allowing the rebellion in his territory. He was deprived of all rank and titles and now appeared in the ordinary dress of a Chinaman without any official robes or hat.

He certainly did not look the sort of man to put down a rebellion, a pleasant unsophisticated old gentleman with none of the energy of his cousin, the Ho-hsa sawbwa. He remarked in the course of conversation that he did not drink liquor much, as he was afraid it might rot his beard!

He was very anxious to go to Burma, but had to wait till his son was old enough to take his place in the government of the state. The Chinese do not allow a sawbwa to leave his own country for any length of time until his son is fit to act as regent.

S P 361 The valley in which the two states of Ho-hsa and La-hsa[1] lie is some 14 miles long and not more than two miles across at the widest point. Every inch of the flat ground is cultivated, and the villages are all built at the foot of the hills, evidently because space cannot be spared for them on ground which is capable of being irrigated for rice cultivation. The soil is poor, and the crop of rice grown is barely enough for the people to live on. Consequently large numbers of men, estimated at 2000 yearly, go out every winter and spread over the neighbouring Shan States and the north of Burma in search of work. Most of those who go out, work as carpenters and blacksmiths, in which trades they have a considerable reputation.

S P [134] [243] S P [463]

S 101 The chief claim to interest of these two states is that they are inhabited by a distinct race who do not exist

[1] Hu-sa and La-sa in Chinese, and Hotha and Latha in Burmese. The two states are often spoken of collectively as Möng Hsa by the Shans, and Maingtha by the Burmese.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

to 33 degrees North. It has a mild winter with little or no frost or snow, and a warm summer. The average annual precipitation in most parts of the Basin is about 34 inches, with some rain in every month. The summer months, however, have more rain than the winter months. There is almost continuous high relative humidity, and wind, on the whole, is conspicuous by its absence.[1] 132

The Basin is drained and practically bisected by the Yangtse River. The Yangtse enters the Basin at the southwest and leaves it at the northeast. Within the Basin, the Yangtse is fed by three sets of tributaries--one from the north, one from the northwest, and one from the south. The northern and northwestern tributaries rise in the high mountains which rim the north and northwestern part of the Basin, and their flow greatly exceeds that of the southern set of tributaries. On the whole, the Basin, with its hilly terrain, is well drained. In fact, problems of erosion are much more acute than problems of drainage. 133

Generally speaking, the soils of the Basin fall into two main groups. One is the extraordinarily fertile soil of the Chengtu Plain and the other is the moderately fertile soil known as the "purple-brown (forest)" type,[2] which dominates in most parts of the Basin. The Chengtu Plain soil is derived from the alluvial deposits of the Min River. The richness of this soil is greatly enhanced by its annual renewal through the overflow of the Min. The Chengtu Plain soil is noted for its very dark color, great depth, and rich humus content. The "purple-brown" type, developed in deciduous forests growing on parental material derived from the friable, cretaceous shales and sandstones, is only moderately fertile for agricultural use. This soil is noted especially for its loose texture and easily-eroded qualities. Moreover, this soil has a peculiar characteristic of absorbing and loosing (evaporating) water quickly.[3] One evening's thick fog may cause the whole depth of the surface soil to be thoroughly moistened and saturated, whereas a continuation of clear sky for several days may cause the soil to dry up and crack. In general, the "purple- 134

---

[1] Bureau of Reconstruction, Annual weather report (Szechuan, 1939), p. 29.

[2] J. Thorp, Soil Geography of China (1936), p. 200.

[3] H. Yu, "A Preliminary Observation of the Purple-Brown Soils of Szechuan Province," Soils Quarterly, January, 1941, p. 39.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

134 brown" type soil is rich in mineral foods but rather low in humus content and is shallower in depths than the soils of the Chengtu Plain. However, on account of the hilly nature of most parts of the Basin, soil characteristics vary greatly in different local areas.

311 241 In many ways, the distribution of agriculture and forestry and the features associated with these uses of the land are related to and conditioned by one or more of the natural elements characterized in the foregoing paragraphs. Forests mantle the [137] mountain slope, and tree crops are characteristic of many of the hillsides. Agriculture dominates the Chengtu Plain, and is conspicuous along the numerous valley floors and on the terraced hills.

133 311 Of all the natural elements at work in the Basin, topography is a highly important factor that affects the agriculture land use and other forms of cultural life, and the adjustment to this natural element is especially conspicuous. First of all, the close correlation between the cultivated-land index and the topography is most striking. In general, there is a consistent tendency for the cultivated-land index, and the population patterns as well, to decrease from the center of the Basin to the peripheral highlands. Second, the adjustment of the Basin's settlement forms to the topography is outstanding. 361 As in most parts of China, about 85 per cent of the population of Szechuan Basin is rural. But unlike any other part of China, there are comparatively few large villages and nuclear hamlets, with the exception of the Hsien[1] capitals. This remarkable fact is largely a result of the rugged and extremely dissected topography of the Basin. The settlement forms have had to adjust to the local topography. This is particularly true in the eastern and northern parts of the Basin.

312 In the agricultural adjustment to water resources and drainage patterns, the following examples may be noted. First, by seizing the torrential flow of the Min River, the Basin has built not only the oldest but also the most successful and easily-maintained irrigation system of all China. This system has freed the Chengtu Plain from the hazard of floods and droughts, and has insured the unbroken agricultural prosperity of the Basin. This

---

[1] Hsien or district in China corresponds somewhat to the county unit of the United States.

● 134
102

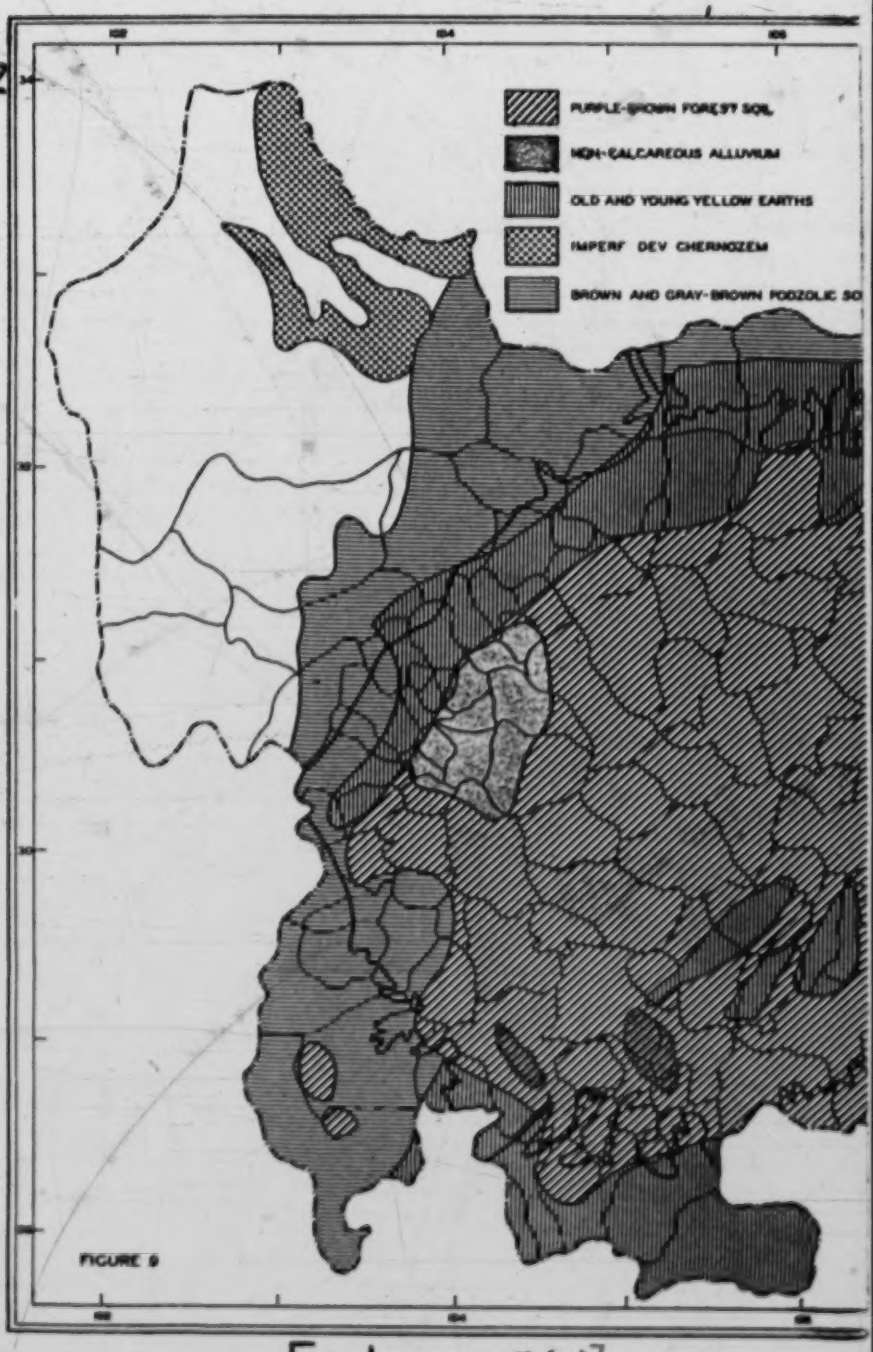
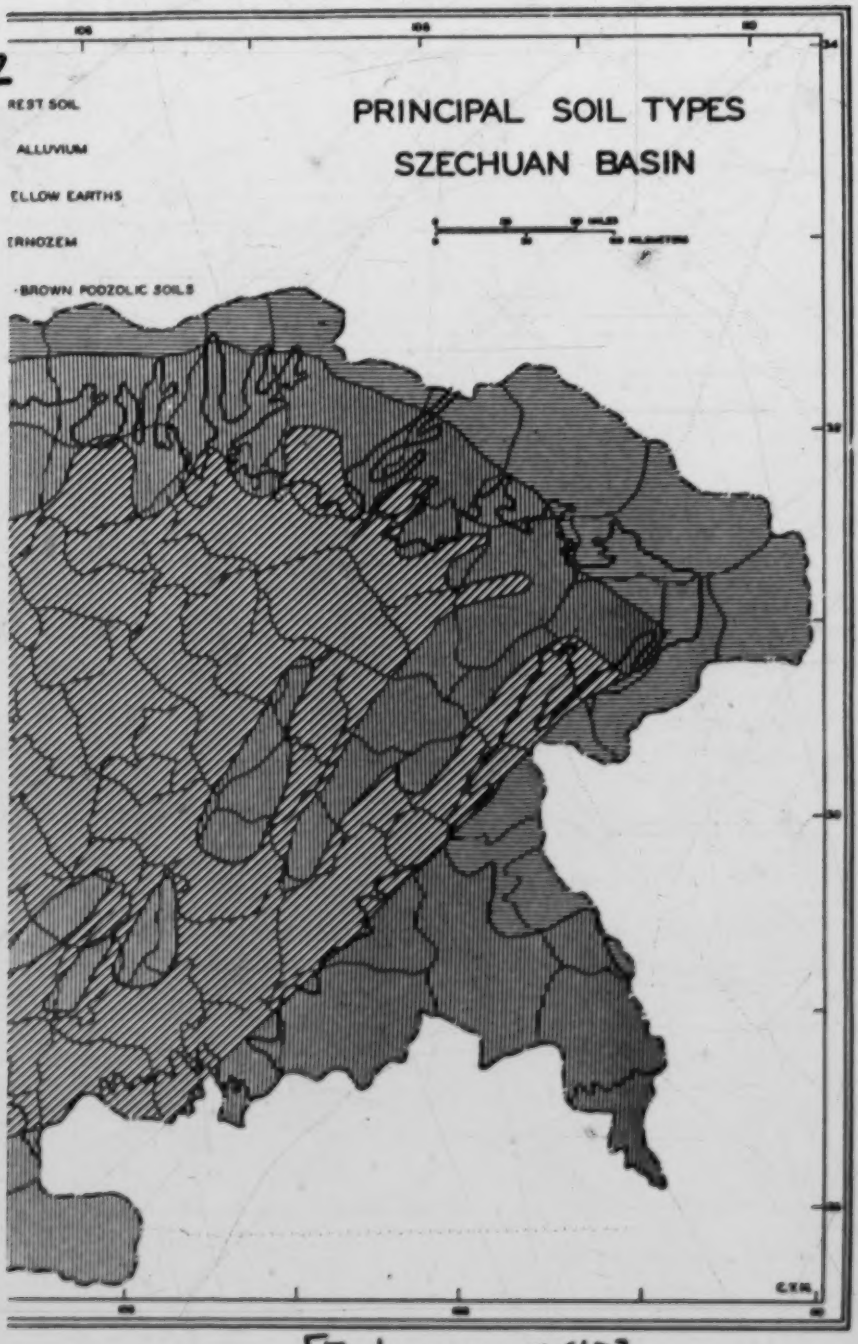


FIGURE 9

[End map 5(a)]

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

134
102



[End map 5 (6)]

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

areas of vegetation associations within the Basin[1] (Fig. 8). They are, first, the pine-cypress-banyan-bamboo association, occupying a large portion of the central and southern part of the Basin; second, the dense mixed coniferous-deciduous--mainly chestnuts (Castanea), oak (Quercus), and sweet gum (Liquidambar)--grassland associations, occupying the highland areas surrounding the Basin; and third, the coniferous (composed of mainly the Genera Abies, Picea, Tsuga, and Larix) grassland-Rhododendron associations, occupying a large part of the western Basin.

Particularly in the third of the areas mentioned in the preceding paragraph altitudinal zonation of vegetation is clearly shown.[2] As a rule the forests are on higher levels, whereas the intermediate slopes are covered with grass vegetation. Northwest of the Basin there lies the well-known "prairie" area, including both the tall bunch and short grasses (mostly stipa and some thick sods of Avena and Festuca) developed on the degenerated chernozem soils of the Sung-pan districts.

4. Soils

As soils will be discussed in more detail in connection with the agricultural land use, only the principal soil regions will be mentioned at this point. Generally speaking, there are three soil regions of major significance in the Basin[3] (Fig. 9), namely, (1) the purple-brown (forest) soils, distributed in most parts of the Basin, (2) the non-calcareous alluvium and rice paddy soils mainly in Chengtu Plain and some other minor river valleys, and (3) the slightly to moderately podsolized old and young yellow earths found in the peripheral highland and anticlinal ridge areas of the Basin.

B. Major Elements in the Cultural Landscape of the Basin

1. Population Patterns

The most striking feature of the population pattern of the Szechuan Basin is that with the exception of the areas around

---

[1] C. S. Fang, Personal correspondence, April 16, 1941.

[2] Ibid.

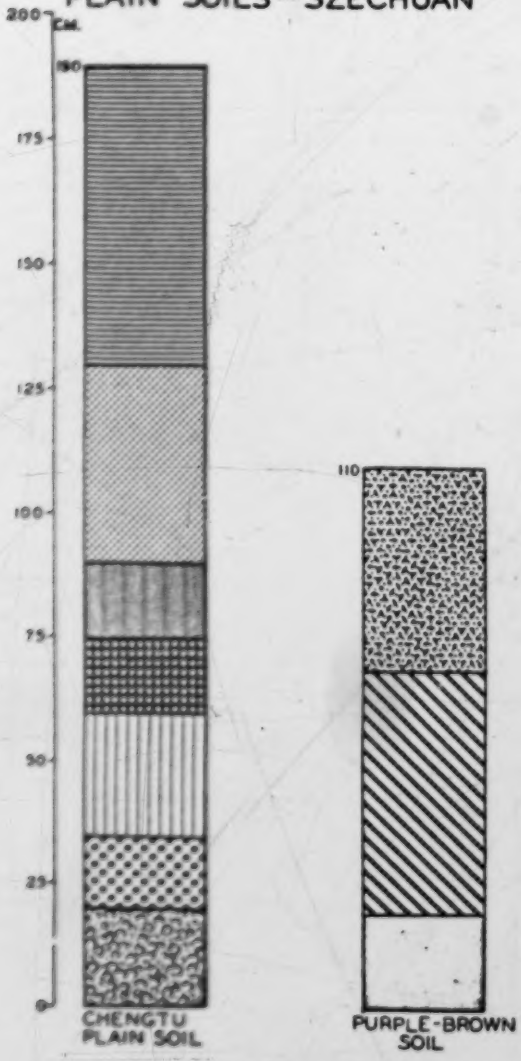
[3] J. Thorp, Soil Geography of China, Plate 1, 1936.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

FIGURE 26

●134

TYPICAL PROFILES OF THE PURPLE-BROWN AND CHENGTU PLAIN SOILS--SZECHUAN



[Face p. 50]

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

and style of the house-types of Szechuan, as already mentioned, it has a dominant influence on many special agricultural products here. The notable example is the production of white wax. 132

In short, the unique Szechuan climate, characterized by moderate rainfall, high average annual temperature (long growing season), high humidity, low evaporation, and virtual absence of wind, is almost ideal for agricultural production.

2. Agricultural Land-Use and Soils

The soil of Szechuan Basin is unique not only by virtue of its red and purple color, which first gave the region its name,[1] but also because of its penetrating, loose structure, its quick formation and renewal, and its relatively high fertility. Generally speaking, there are three major soil groups within the Basin, namely, (1) the purple-brown (forest) soils, which are distributed in most parts of the Basin; (2) non-calcareous alluvium and rice paddy soils, which are concentrated principally at Chengtu Plain and some other minor river valleys; (3) the slightly to moderately podsolized old and young yellow soils, which are found in the peripheral highlands, as well as in the longitudinal anticline areas of the Basin (Fig. 9). 134 ●

a) Purple-brown (forest) soils.--According to Thorp,[2] who first made a reconnaissance study of soil conditions in the Basin, and who first offered the generalized map showing the boundaries of various soil groups, the characteristic purple-brown soils consist of slightly acid or neutral, purplish brown, or reddish surface soils, 15 to 50 centimeters thick, underlain by purple clay or clay loam soils, whose depths are seldom over two feet.[3] The color varies, depending upon the parental materials. In the western and southern part of Szechuan Basin the soils of this group are frequently reddish purple or reddish brown in color, following the color of their parent rocks. The soils are moderately rich in mineral plant foods, and are particularly tillable.

One of the most interesting physical properties of this group of soils, as recently reported through several experimental

---

[1] Richtofen, op. cit., p. 182.

[2] Thorp, op. cit., chaps. ix-xii.

[3] Ibid., pp. 202-204.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

134

studies,[1] is the rapid rate of absorbing and losing water. It is commonly observed that one evening's thick fog may cause the whole depth of the surface soil to be thoroughly moistened, while a half day's torrential rain may cause the soil to be completely saturated and washed out. On account of this quick rate of absorption the soil can hold little water, and therefore cannot stand a high rate of evaporation. Anyone who has visited the farms here can testify to the fact that after a few continuous clear days the soil often becomes dry and cracked. According to Yu, in June, 1940, after a continuous clear sky for seven days, the water content of this purple-brown soil was so depleted that corn crops withered and suffered a 50 per cent loss that season.[2] A typical soil profile of the purple-brown soil is shown in the accompanying diagram (Fig. 26).[3]

The purple-brown soil in most places occurs on the undulating or rolling topography of hilly lands of various heights, ranging from 8 to 10 meters to several hundred meters. The areas with purple-brown soils have been terraced and planted in rice whenever water could be obtained for irrigation. In many places, rice paddies reach the tops of the hills. In case these fields cannot be irrigated, they are used for all "dry" (unirrigated) crops, such as sweet potatoes, wheat, corn, broad beans, and others.

b) Non-calcareous alluvial soils.--Secondly, from the standpoint of agricultural land-use, the most important soil group, though covering relatively a much smaller area than the purple-brown soil, is the non-calcareous rice paddy soils of the Chengtu Plain and some other minor river valleys. They are formed mainly by the alluvial deposits brought down from the rich black soils (chernozem areas) washed down from the Tibetan Borderlands. Generally speaking, in their outer appearance, these soils look very much like soils one commonly sees in the Lower Yangtse Valley. In many places they are dark in color and are mottled in rust. Their textures are fairly heavy and hold water very well. There are also large areas of these rice paddy soils of Chengtu Plain which

---

[1] Yu, op. cit., p. 41.

[2] Ibid., p. 40.

[3] Data from Thorp, op. cit., p. 200.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

LEGEND FOR FIGURE 26*

• 134

Chungking Clay Loam
(Purple-Brown Soil)

Horizon	Depth (Cm.)	Descriptions
A	0- 20	Brownish purple, very friable, and finely granular, moderately porous, loamy clay containing a high percentage of worm excrements. Slightly acid.
B	20- 70	Light reddish purple, friable, medium granular clay which also contains many worm excrements.
C	70-110	Reddish purple soft shale of clay texture. Reaction approximately neutral.

Chengtu Plain Soil

Horizon	Depth (Cm.)	Descriptions
1	0- 20	Dark gray and rust-mottled, friable and porous silty clay.
2	20- 35	Similar to above but slightly lighter colored.
3	35- 60	Reddish yellow and light gray, mottled, stiff clay with a few pores. The soil shrinks considerably while drying. A few small lime and iron concretions.
4	60- 75	Medium gray clay or heavy clay with a few rust specks. The material is stiff and shrinks very much on drying. It contains a few dark brown iron concretions from 1 mm. to 1 cm. in diameter.
5	75- 90	Gray and dark brown mottled, mottled, friable clay with moderate shrinkage when drying. Contains a few soft iron concretions.
6	90-130	Dark brown clay with a few gray streaks.
7	130-190	Dark brown and olive-drab, mottled, loamy clay with friable consistency and a few dark brown concretions.

*Data from Thorp, op. cit., pp. 200 and 387.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

show but little evidence of podsolization.[1] A typical profile of this soil is shown below (Fig. 26).[2] These soils are used principally for rice production and some other crops, such as wheat, tobacco, and various kinds of vegetables. It is necessary to emphasize again the extreme fertility of these soils and the significant part they have played in the agricultural success of the Basin. 134

Besides the rice paddy soils, on the low hills and high river terraces of part of western Szechuan Basin, particularly in the vicinity north of Chengtu, there are small patches of dark grayish brown coarse soils. Many soil scientists prefer to call these soils "Chengtu Clay."[3] Some people believe these "Chengtu clays" were probably true loesses at one time but have lost their columnar structure and are now characterized by primatic and cloddy structure.[4]

c) Podzolized old yellow earth.--Third, the gray-brown yellow soils occupying the surrounding hills of the Basin are generally less fertile and are agriculturally unimportant.

d) Other soils.--On account of the unique geological structure and rock formations of the Basin, one peculiar form of soil erosion has been extensively developed here. With the alternating beds of purple sandstones and shales which have been recently folded and deeply eroded, and in places where the surface slopes of such smooth rock formations correspond to the slopes of hills, soil creep is easily induced. Many times the thin surface soils have been completely removed, leaving only bare rocks. In the case of shales, on account of their comparatively rugged surface, the situation is less grave. Soil creep constitutes one of the most serious problems of agricultural land-use in the Basin, and challenges immediate attention.

3. Agricultural Land-Use and Topography

133
311

With the exception of Chengtu Plain and some other minor comparatively broad river valleys (such as the To and Fou River

---

[1] Ibid., p. 121. [2] Ibid., p. 391. [3] Ibid., p. 387.

[4] J. Thorp and D. Dye, "The Chengtu Clays, Deposits of Possible Loessal Origin in Western and Northwestern Szechuan Basin," Bul. of the Geol. Soc. of China, X, No. 2 (1936), 228-46.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

311 133 melting during the summer is reliable. At Kuan-hsien, where the torrent of the Min first enters the Plain and is taken under human control, the waters are divided into several large canals, each of which is subdivided in turn into innumerable smaller canals and ditches. The life-giving waters are impounded by dams, stone revetments, and other devices, and are held for irrigation purposes. The irrigation of the Plain has another advantage in that the soils are seldom troubled by salt and fine mud which often clog irrigated soils in other areas; because the considerable rainfall in Chengtu Plain, with an annual average of about 900 millimeters, is sufficient to prevent such clogging.

●134 The soils of Chengtu Plain consist principally of the dark and dark-gray paddy soils. They are formed mainly from alluvial deposits brought down from the rich black soil (chernozem) of the Tibetan border-land and Kokonor (Fig. 9) by the mighty Min River. The natural richness of these soils is enhanced even further by the annual renewal. Because of this fact, soils of the Plain, unlike the paddy soils of many other parts of China, are not strongly podzolized.[1] However, the soil conditions do not appear to be uniform throughout the whole Plain. In fact, there are considerable differences in texture, color, and profile according to slight differences in local relief.[2] For instance, in the upper Min River region, as in Kuan-hsien, the soil texture is much coarser than in the lower Plain areas.[3]

One of the most interesting practices in connection with soil culture in the farms of Chengtu Plain, is the building of little stone wing dams or projections along the stream banks out into the water. Behind these projections, the streams, in the course of a back eddy, deposit silt and sand, which are frequently rich, particularly in organic matters. All these mud accumulations are carefully dug out and carried in baskets to the fields. Many times muddy waters have been led into basins or rice paddies in order that fine fertile silt might be precipitated on the fields.

241 433 d) Agricultural products of Chengtu Plain.--The Plain is noted for its diversity of agricultural products. It produces

[1] Thorp, op. cit., p. 391.

[2] Ibid., p. 387.

[3] Ibid.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

3. The Self-sufficient Subsistent Agricultural Area of the Northern Basin

241

North of Santai in the west and Ho-chuan in the east (Fig. 24), almost in a straight line, lies the self-sufficient subsistent agricultural area of the northern Basin. This agricultural area is characterized by its more rugged and dissected topography, more irregular hills, and higher local reliefs. These conditions are particularly true in the northern half of the area at the vicinity of the upper Fou and Chialing valleys.

The most interesting aspect of this agricultural area, as its name implies, is its ultra self-sufficient and subsistent character of its agricultural practices. Although most of the agricultural areas of the Basin are principally subsistent in nature, the present agricultural area of the northern Basin represents the most extreme case.

Here, in crop association, no single crop is particularly predominant. Most of the farms produce a little of everything within a greatly varied assortment of crops. These crops are completely for home use. In general, potatoes, wheat, rice, barley, millet, rape, beans, kaoliang, corn are the common crops on farms. This peculiar situation is conditioned by two factors, namely, the extremely dissected topography and the peculiarly friable rock structure. The dissected topography causes the extremely detached character of the settlement forms (consisting of isolated farmsteads perched on various hillocks), whereas the friable rock structure with numerous fall lines, makes the available river transportation very difficult. Therefore, these conditions make it even more difficult for farmers in this area to communicate with the outside world and thus accentuate their self-sufficient agricultural economy.

134

The soil condition of this area is also interesting. With the exception of a few narrow detached stretches of alluvial soils along the river banks, and some yellow earths at its northern periphery, the soils of this area is consisted of principally the unique "purple-brown" type of the Szechuan Basin (Fig. 9). In fact, the distribution of this fertile soil here is so uniform and continuous that this self-sufficient agricultural area of the northern Basin should be properly called the "genuine" purple-brown soil region of the whole Basin.[1]

---

[1]Chu, op. cit., p. 46.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

Another interesting characteristic of this agricultural area of the northern Basin is that this area is the most important producing center of a very important semi-agricultural product, the herbs, in the Basin. In addition to the meager subsistent agricultural production, the herb furnishes as a very important "cash crop" for the farmers. This is mainly due to the fact that in this area there are large tracts of land where the slope is too steep and the soils are too shallow for regular crop production. These lands are used, either in cultivated form or in "wild growths" for herbs.

Other outstanding features of this agricultural area include its moderate population density (Fig. 10), its specially thick cypress growths, and the conspicuous absence of coal, iron, nanmu, and pine vegetations.

4. The Combined Agricultural and Forestry Area of the Eastern Basin

In terms of both the agricultural prosperity and the general appearance of its agricultural landscape, this combined agricultural-forestry area of the eastern Basin (Fig. 24) is the least attractive and poorest. Here the topography is dominated by the numerous steep high parallel anticlinal ridges. Plains and gentle hills are even more restricted.

As to soils, in addition to the usual "purple-brown" type of the Basin, there are numerous tracts of soils, old and young yellow earths, which are derived from limestone parental materials. In most cases these soils are shallower in depths than the purple-brown type and are much slower in the rate of renewal. These factors handicap considerably its efficient agricultural production.

The principal crops here are potatoes, hemp, rice, corn, wheat, and kaoliang. Although rice is reported to be grown in every district of this agricultural area, its acreage is more limited here than in any other agricultural area.

The agricultural land-use of this area is controlled largely by its topography. Agricultural lands here are derived from two principal sources, first, on the manger-like trough lands at the top of the broad anticlines wherever the bed rocks happen to be less resistant than the surrounding structures. These trough lands are, however, rather restricted in extensions.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

5. The Mixed Farming Area of the Southwestern Basin

Among all the principal agricultural regions of the Basin, the mixed farming area of the southwestern Basin (Fig. 24) is the most interesting. Here lies an area like a synthesis of all the above four areas. Besides its own unique quality, as we shall see shortly, this area possesses some characteristics of each and every one of the above four agricultural areas. This condition is true in topography, soil, crop association, and other aspects.

In topography, for instance, this area possesses some of the anticlinal ridges (but lesser in magnitude) like the eastern Basin; some irregular hills like the northern Basin; and some broad plains (in smaller extensions) like the Chengtu Plain, or rather, like the lower To-Fou valleys. However, unlike all the above four agricultural areas, the absolute relief here is, on the whole, the lowest, averaging about 300 meters above sea level.

In soil, this area is also a miniature model of the above four agricultural areas. The usual purple-brown soils of the northern Basin, the limestone soils (old and young yellow earths) of the eastern Basin, and the rich alluvial soils of the Chengtu Plain and To-Fou valleys are all present here (Fig. 9).

In agricultural land-use and crop association this area has the greatest variety of products. The broad river valleys of the Min (lower) and Yangtse furnish fertile fields for rice, sugar-cane, and orange groves. The more hilly lands, terraced in minute steps, are used for corn, wheat, rape, hemp, barley, potato, beans, and other crops. Unlike the other four areas, corn is the most predominant crop here. Moreover, on the steep slopes of the high anticlines, or on other more hilly areas, numerous forestry products, such as tung tree, tea, white wax, mulberry trees, and various kinds of bamboo, are found. Especially, the bamboo products and white wax are the most famous.

Above all, another interesting feature of this area is the bona fide tropical character of its agricultural and horticultural products here. Climatically, with the exception of the southeastern highlands of the Basin, this area is the warmest among all the agricultural areas of the Basin (Fig. 24). Such well known tropical products as Li Chi, Lun yen, bananas, and palm vegetation are found here.

Another special feature of this area is the difference in its water use. Like Chengtu Plain this area is endowed with

2: Wiens G-4 (no date) 1954 AF17 South China AF 17 Southwest China AF 16 Miao AE 5

S 175 563 642 M 175 563 648

Ch'uan otherwise known as General Fu Yu-te, as the "South-Pacifying General.". He was instructed to lead an army to conquer Yun-nan which had reverted to the independent rule of local chieftains after the collapse of the Mongol Dynasty. General Fu Yu-te commanded an army of 100,000 which assembled in Hu-kuang Province (Hu-pei and Hu-nan area). Aside from a part of his army which he dispatched post-haste to Wu-san (present-day Wei-ning in western Kuei-chou)(See Photos 7 and 8), he personally led the main body. He entered Kuei-chou from Hu-nan along the Yuan River route. It is readily understandable that with Fu Yu-te's large army burdening the area, many Miao would feel compelled to migrate southward. And when the north Kuang-hsi Miao of today are asked at what period they migrated there, they invariably reply with the two characters Hung-wu for the first Ming Emperor's name, showing that they migrated there at the end of the 14th Century.

A few Miao are found scattered among the Li tribes of Hai-nan Island. During the reign of Chia-ch'ing (1522-1567), there was a major suppression campaign against the Li tribes of Hai-nan. At this time, Kuang-hsi Miao

* * *

SW 133 134 241

Photo 7. Wei-ning district, Kuei-chou Province (26° 52' N, 104° 17' E)

North of the town of Wei-ning and the Ts'ao Hu shown in Photo 6, the characteristic plateau forms of northwest Kuei-chou reveal a topography that in the large appears relatively even except where mountain systems such as the Miao Ling at the upper left of photo span the surface. The rugged parts of the non-mountainous terrain are found where great canyons and deep, narrow valleys such as the one in the foreground have been eroded far below the surface of the plateau. The middle terrain is pock-marked with an almost straight line of sink-holes testifying to easily soluble underlying limestone rock that often is found in Kuei-chou. Lolo and Miao slope-farmers cultivate the hilly land in the foreground, and terrace ridges run down the inter-locking ridges of the great canyon. Many terraces appear to be abandoned. The slope soils are poor, acidic yellow earths from which fertility goes quickly with crop cultivation.

"They will not dare, they will only threaten." 000

"They will attack. They are Horba monks who are notorious for their quarrelsomeness. There are five of you and eight of us (a lieutenant, a Tung sche and six soldiers). We have only muskets whereas the lamas have a good deal more than 1,000 fighting monks and many modern repeater guns. "Of course," he added, "if I had 250 men with modern guns, then I could be in command here. But inasmuch as I am given only 10 of actually 50 soldiers (four of them he had apparently stuffed in his pocket and eaten), I am myself merely tolerated here and not much better off than you are."

Since I had very little hope, actually, of seeing the Gantse monasteries and studying them, I yielded to the wishes of the Chinese and rode past Gantse on the road due south. C 134

Near the ferry there arose a chain of hills which even from a distance had betrayed the fact that they were loess, because of their pale yellow color. There was a steep path leading up from our campsite and when we reached the top, the valley of Hor Gantse lay before us. It extends north from the Dsa Chu and is wide and fertile. Terraces of loess and hollows in the loess showed fertile yellow earth down to 20 meters, and owing only to this a rich cultural oasis has been established here in the midst of wild mountains, and castles and lama monasteries have been able to spread themselves out here.

First we passed an estate of the Mazar Tuse family, and then one large structure after another appeared on either hand. "Here the Mazar T 361 family spend their summers, there /179/ a cousin of theirs lives. Over there lives the hutukhtu of the big monastery of Lhaba gomba," explained my cicerone and lieutenant who, touchingly enough, stayed beside me all day long and accompanied me on almost all my gambols. On a promontory in the eastern part of the valley he showed me a larger lama establishment of the Gelugba sect which was presumably a T 532 Chinese sanctuary of the Tang period and had been established by one of the Chinese princesses who was married to a Tibetan king. Lu ming yang explained that the picture of the princess and her minister was shown to this day and held in esteem. Unfortunately I could not discover whether in reality it was not just a Tara picture and thus one of the common portrayals of Wen tscheng, the Chinese wife of the Tibetan Emperor Srong btsan sgam bo (Chinese: Tschi tsung lung tsan), the daughter of Emperor Tai tsung (627-750) of the Tang dynasty, along with the Minister Gar gdon btsan. The marriage of Wen tscheng (Wen tschun) took place around the year 636. The soldiers told me she was Tschou tschun niang niang and maintained that this picture

6: Tafel--445 T-3 (1905-1908) 1914 AJ1 Tibet

SW. China AF16

/276/

• 134

Fig. 13

Diagram showing how loess dust is deposited in the border-valleys of East Tibet during winter storms; "L" indicates "loess"; arrows indicate direction of winds.